Cooperative Extension Service
C/T/A/H/R
College of Tropical Agriculture & Human Resources
University of Hawaii at Manoa

Horticulture Research Note
June 1997
HRN-4

Height Control of Dendrobium Orchid

Richard A. Criley, Department of Horticulture

Objective

The purpose of this experiment was to determine if flurprimidol would be effective in controlling plant height of dendrobium orchid. Cut-flower dendrobiums offer potential as flowering potted plants because of the longevity of their floral display, but most selections are too tall at blooming for ease of handling in the pot sizes normally used in the trade.

Flurprimidol has been reported as a highly effective retardant on a number of flowering ornamentals (Barrett 1983). For comparison, ancymidol (Arest) and ethephon (Florel) were evaluated—ancymidol because it is an analogue of flurprimidol and ethephon because of its success as a retardant when applied as a drench (Shanks 1969, Freeborg and Daniel 1979).

Methods

Flurprimidol was applied as a foliar spray of 10 or 20 mg a.i./liter or in granular form (1, 5, or 10 mg a.i.) to the medium surface. Ancymidol was applied as a foliar spray of 25 or 50 mg a.i./liter. Ethephon was applied in a 200 ml drench to the medium at the rates of 200 and 400 mg a.i./pot. The sprays were formulated with 0.05% Tween 20 and applied to the drip point.

A group of two- to three-year-old dendrobium orchids, 'Jaquelyn Thomas UH232' (Kamemoto et al. 1976), were selected and graded into nine blocks (reps) of 10 plants each by size. The tallest pseudobulbs (stems) measured 15 to 40 cm at the time of treatment. The plants were grown in 15 cm pots in a medium of no. 3 blue rock (a coarse basaltic rock) and irrigated by an automatic spray system three times per week. Plants were fertilized by spraying biweekly with a solution of N-P-K 20-8.8-16.6 fertilizer at 12 kg/100 liters.

After treatment with the retardants, the plants were arranged in randomized blocks to avoid shading of the short replicates. Pseudobulb number and length of the tallest one in each pot were determined at the beginning of the experiment for possible use in covariate analysis.

After six weeks, there had been no change in plant height. Dendrobium pseudobulbs reach a finite height, flower, and then produce new pseudobulbs from basal nodes, rather than elongate the existing axis. Some new pseudobulbs could be seen at the base of the plants, so it was decided to repeat the treatments and follow the development of the new pseudobulbs. The plants received the same treatments as before. The tallest new pseudobulb was marked and its length was determined. Due to starting with new growths, the original blocking of replicates by size was no longer an effective means to reduce variation. Also, there was no new growth on the two smallest replicates, which were therefore discarded in the analysis of variance.

Eight and 21 weeks after the second treatment, the length of each marked pseudobulb was determined and the number of internodes on the distal 20 cm was counted. An internode length was calculated. Little flowering occurred, but the presence or absence of flowers was noted.

Results and discussion

Whether determined as pseudobulb length or internode length, the control plants generally showed the greatest growth after both 8 and 21 weeks. The flurprimidol-treated plants showed a very marked, close-noded retardation effect (Figure 1). Leaves were large and thick and the pseudobulbs were swollen on the flurprimidol-treated plants. Ethephon-treated plants

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Charles W. Laughlin, Director and Dean, Cooperative Extension Service, College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa, Honolulu, Hawaii 96822. An Equal Opportunity / Affirmative Action Institution providing programs and services to the people of Hawaii without regard to race, sex, age, religion, color, national origin, ancestry, disability, marital status, arrest and court record, sexual orientation, or veteran status.

were much taller but had smaller leaves, shorter internodes, and thinner pseudobulbs when compared to control or the other retardant-treated plants (Figure 2).

While all retardant-treated plants were significantly different from the controls after 8 weeks, at 21 weeks both ancymidol- and ethephon-treated plants were not different from the control but differed from the flurprimidol-treated plants (Table 1). Internode length was significantly less for retardant-treated plants than control plants at 8 weeks, but at 21 weeks differences were negligible. Analyses for a linear effect of concentration were not significant for any chemical.

Control plants produced a few short spikes of flowers during the 21-week observation period, but only two flower spikes occurred on the retarded plants. This may have been due to suppression of the axillary meristems where floral axes develop by the double dose of retardants or to immaturity of the new growth. A single flower spike on one of the flurprimidol-treated plants (10 mg a.i./liter) showed a thickening and compactness typical of retardant effects, but the new pseudobulbs produced few flowers. As no flowers were produced on the ethephon-treated plants, it was not possible to determine if the chemical caused distortion.

Both flurprimidol and ancymidol controlled plant elongation over an eight-week period, but owing to the double dose applied, a recommendation for application rate and frequency requires further refinement. A report (Kunisaki et al. 1987) published subsequent to this work, but based on it, indicated that six months after treatment, flurprimidol was more effective than ancymidol at equivalent concentrations, with a single application of 0.33 mg a.i./liter causing a 50 percent height reduction, versus about 33 percent for the ancymidol treatment.

Table 1. Effects of ancymidol, flurprimidol, and ethephon 8 and 21 weeks after treatment on pseudobulb length and distal internode length of *Dendrobium* 'Jaquelyn Thomas UH232'.

Treatment–Method	Pseudobulb length (cm)		Internode length (cm)	
	8 wk	21 wk	8 wk	21 wk
Control	32.7	44.3	4.0	2.3
Ancymidol–spray				
25 mg a.i./liter	24.3	44.0	4.4	2.1
50 mg a.i./liter	30.2	42.9	3.9	2.1
Mean	27.2	42.9	3.9	2.1
Flurprimidol–granules				
1 mg a.i./pot	22.1	38.7	3.1	2.1
5 mg a.i./pot	20.2	34.4	3.3	2.0
10 mg a.i./pot	22.0	37.0	3.2	1.9
Mean	21.6	36.6	3.2	2.0
Flurprimidol–spray				
10 mg a.i./liter	17.0	38.0	3.4	1.8
20 mg a.i./liter	26.4	36.3	3.7	2.0
Mean	21.5	37.2	3.5	1.9
Ethephon–spray				
200 mg a.i./pot	27.8	56.1	2.6	2.2
400 mg a.i./pot	25.8	53.9	2.8	2.1
Mean	26.8	54.9	2.7	2.1
Comparisons				
Control vs. other	*	NS	**	NS
Ancy + Eth. vs. Flur.	*	**	NS	NS
Ancy vs. Eth.	NS	**	**	NS

Figure 1. Plants of *Dendrobium* 'Jaquelyn Thomas UH232' six weeks after foliar application of flurprimidol at 10 (left) and 20 (right) mg a.i./liter.

Literature cited

Barrett, J.E. 1983. Comparison of growth retardant activities of EL-500 with ancymidol, chlormequat, and daminozide on flowering ornamentals. Plant Growth Reg. Bul. 11(4):8–10.

Freeborg, R.P. and W.H. Daniel. 1979. Growth regulation of *Poa pratensis* with ethephon. Proc. 6th Ann. Plant Growth Reg. Working Group. p. 68.

Kamemoto, H., J. Kunisaki, Y. Sagawa, and C. Bobisud. 1976. *Dendrobium* Jaquelyn Thomas UH232. Univ. of Hawaii, Dept. of Horticulture. Horticulture Digest 30:4.

Kunisaki, J., J. Imamura, T. Higaki, and J. Silva. 1987. Height suppression of dendrobiums with growth regulators. Proc., 1987 Hawaii Commercial Orchid Growers Conf. CES-HITAHR, Univ. of Hawaii. p. 67–71.

Shanks, J. R. 1969. Some effects and potential uses of ethephon on ornamental crops. HortScience 4:56–58.

Figure 2. Comparison of control (left), ethephon (center), and flurprimidol (right) treated plants of *Dendrobium* 'Jaquelyn Thomas UH232' six weeks after treatment . Note the thin pseudobulb and short narrow leaves resulting from the ethephon treatment and the thickened pseudobulb and short, thick, rounded leaves of the flurprimidol treatment.